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(54) **A tamper-proof closure for bottles and the like**

Originalitätsverschluss für Flaschen und dergleichen

Fermeture inviolable pour des bouteilles ou similaire

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## Description

This invention relates to a tamper-proof closure for a bottle and the like, as defined in the preamble of Claim 1, according to the example shown in EP-A-0 225 394.

It is a recognized fact that such closures, while being satisfactory on the whole and widely employed, still have a drawback in that they provide inadequate indication of having been unsealed and that, when first unsealed, they perform in a less than positive, random, and ultimately inconsistent fashion.

If the sealing band, once separated from the cap, stays with the bottle, then it becomes easy, by application of ordinary skill, to set it back against the cap directly as the latter is screwed down again to disguise the unsealed condition. Further, the band interferes with the normal use of the bottle, and after consumption, may require to be removed for re-use of the bottle.

Occasionally, the band may slip off the bottle in pouring, creating an objectionable situation.

The underlying problem of this invention is to provide a closure as indicated, which has such constructional and performance characteristics as to overcome the aforesaid drawbacks.

This problem is solved by a closure of the kind specified hereinabove being as set forth in the characterizing part of Claim 1.

Further features and the advantages of a closure according to the invention will become apparent from the following detailed description of a preferred embodiment thereof, given by way of non-limitative example with reference to the accompanying drawing Figures, showing,

Figure 1 a sectional elevation view of a closure according to the invention, taken along line I-I;

Figure 2 a sectional view through the closure in Figure 1, taken along line II-II;

Figure 3 an enlarged scale, perspective detail view of the closure in Figure 1;

Figures 4 and 5 reduced scale, sectional views through the closure in Figure 1, at successive stages of its operation; and

Figure 6 a perspective view of the closure in Figure 1, at a further stage of its operation:

With reference to the drawing views, generally indicated at 1 is a tamper-proof closure for a bottle 2.

The closure 1 comprises a cap 3 having an axis X-X. A threadway 4 is formed internally on the cap 3, and a corresponding threadway 5 is formed externally on the bottle 2. Thus, the cap 3 can be screwed off and onto the bottle 2 whenever required, by turning it in the directions of arrows F and G, respectively.

The closure 1 also comprises a sealing band 6, formed integrally with the cap 3 coaxially therewith, such as by an injection molding process using a suitable plastics material. The sealing band 6 is substantially tubular in shape, with a predetermined height from an upper edge 6a to a lower edge 6b. The upper edge 6a of the

sealing band 6 is connected to the cap 3 across a weakening line 7 which is obtained by providing bridge portions 11, 12, 11a to be described.

In this closure 1, the sealing band 6 is split into two identical arched sections, both denoted by 8 and having each an angular extension of slightly less than 180 degrees. Each of the arched sections 8 has a leading end 9 and a trailing end 10 in the screw-off direction of the cap.

The ends 9 and 10 of each arched section 8 face the ends 10 and 9 of the adjacent arched section endwise.

Two bridge portions 11 and 12 extend between each of the arched portions 8 and the cap 3. It should be noted that the leading bridge portion 11 is located proximate to the leading end 9 of the arched section, and that the trailing bridge portion 12 is located proximate to the trailing end 10 of the arched section.

The leading bridge portion 11 has a slimmer cross-section, e.g. of 0.3 x 0.3 mm, so as to be frangible. The trailing bridge portion 12 has a cross-section, e.g. of 0.3 x 0.6 mm, selected not to undergo rupture but rather a twisting action to provide a hinge 12a for the arched section 8 about an axis r-r perpendicular to the longitudinal axis X-X of the closure 1.

Formed to full height inwardly of each arched section 8 are two abutments 13 and 14 having a sawtooth-shaped profile. It should be noted that the leading abutment 13 is located proximate to the leading bridge portion 11, and that the trailing abutment 14 is located proximate to the trailing bridge portion 12, downstream of the former in the cap screw-off direction.

The abutments 13 and 14 of each arched section 8 are set apart by an angular distance A, e.g. of about 150 degrees.

Preferably, an auxiliary bridge portion 11a extends between each leading abutment 13 and the cap 3. This has a slim cross-section, e.g. of 0.15 x 0.4 mm, in order to be frangible.

The bridge portions 11 and 12, and the auxiliary bridge portions 11a, of both arched sections 8 form together the aforesaid weakening line 7.

For each of the arched sections 8, the bottle 2 is formed with two teeth 17 and 18 having a sawtooth-shaped profile and being intended for engagement respectively by the abutments 13 and 14 of the respective arched section upon rotation of the cap in the screw-off direction as shown by arrow F.

Said teeth 17 and 18 are set angularly apart by an angular distance B, e.g. of 130 degrees.

Thus, angular distance A will exceed angular distance B by an angular length C of about 20 degrees in the example shown.

The teeth 17 and 18 have an upper edge 18a at a spacing from the edge 6a in the direction X-X.

The trailing abutment 14 is formed with a cutout 14a which defines a ramp 14b extending a predetermined distance from edge 6b and facing forward in the screw-off direction of the cap, so as to engage the upper edge 18a of tooth 18 during the screw-off operation.

It should be also noted that between the end 9 of each arched section 8 and the end 10 of the other, adjacent arched section 8, there extends a thin frangible jumper 19 which is sized to be readily ruptured together with the leading bridge portion 11 and the auxiliary leading bridge portion 11a.

The operation of the closure 1 according to the invention will be described herein below with reference to an initial condition, illustrated by Figures 1 and 3, whereby the closure 1 is installed on the bottle 2, after filling the latter, for example by axial fitting or thread engagement thereof, in the direction of arrow G. In this case, the abutments and teeth overlap each other by resilient engagement of the backs of the sawtooth profiles.

It matters to observe that in the initial condition, the abutments 13 and 14 of each of the arched sections 8 locate at a position angularly ahead of the respective teeth 17 and 18.

The closure is unsealed by screwing off the cap 3, turning it in the direction of arrow F. After a short rotational movement, for each arched section 8, the leading abutment 13 will engage with the tooth 17 in mating relationship of the sawtooth profiles (see Figure 4).

Further rotation results in the jumpers 19, leading bridge portion 11, and auxiliary bridge portion 11a of each arched section being ruptured. Rupture of the jumper 19 and the bridge portions 11 and 11a takes place quite positively, because of these lying close to the abutment, and accordingly, the force will at once concentrate thereon as, after engaging the abutment 13 with the tooth 17, the cap rotation in the screw-off direction is maintained by application of an adequate force.

Following the aforesaid ruptures, the leading ends of each arched section will come free of the other arched section and the cap.

Continued rotation, with an angular lag C equal to the angular difference between A and B of about 20 degrees, will result in the ramp 14b of the trailing abutment 14 engaging the upper edge 18a of tooth 18 (see Figure 5).

As the cap is rotated still further, the ramp 14b of abutment 14 will ride up the tooth 18, thereby the abutment 14 is moved upwards, entraining upwards therealong the trailing end 10 of the arched section. Consequently to this, the bridge portion 12 undergoes torsional deformation about the axis r-r to perform its function as a hinge for the arched section.

In other words, the engagement of the abutment 14 with the tooth 18 generates a torque, denoted by M, causing the arched section 8 to be shifted angularly about the hinge 12a.

Further rotation of the cap results in the arched section being displaced further angularly until the abutment rides over and past the tooth. Thus, the arched section 8 will come to lie obliquely to the axis X-X at a fully visible location (see Figure 6).

A major advantage of the closure according to this invention resides in an improved indication of it having been unsealed.

Another advantage of the closure according to this invention is that the bottle is more convenient to use on account of the sealing band being moved positively away from the bottle.

A further advantage of the inventive closure resides in its dimensional stability, from the time it is manufactured to the time the bottle is opened, as brought about by the jumpers and auxiliary bridge portions provided co-operating with the bridge portions to hold in place the arched sections and form the band.

Understandably, the closure described in the foregoing may be variously altered and modified by a skilled person in the art for the purpose of filling specific and contingent requirements, still within the scope of this invention as defined in the appended claims.

## Claims

1. A tamper-proof closure (1) for a bottle (2) and the like having a longitudinal axis X-X, comprising a cap (3) adapted to be screwed on/off the bottle (2), a sealing band (6) connected to the cap (3) by means of bridge portions (11,12), and abutments (13,14) formed on the band (6) to engage with respective teeth (17,18) formed on the bottle (2), the band (6) being split into at least two arched sections (8), each of the arched sections (8) having a leading end (9) and a trailing end (10) in the screw-off direction (F) of the cap (3), facing the ends (10,9) of the adjacent arched section (8) endwise, characterised in that there are two bridge portions (11,12) and abutments (13,14) for each arched section (8) located respectively at the leading end (9) and the trailing end (10) of each arched section (8), the bridge portion (11) located at the leading end (9) of the arched section (8) having a slim cross-section so as to be frangible upon engagement of the respective abutment (13) with the respective tooth (17), and the bridge portion (12) located at the trailing end (10) of the arched section (8) having a selected cross-section not to be ruptured but to form a hinge (12a) about an axis r-r perpendicular to the axis X-X for angularly displacing the arched section (8), following engagement of the respective abutment (14) with the respective tooth (18).
2. A tamper-proof closure (1) according to Claim 1, characterized in that the abutments (13,14) of each arched section (8) are separated by an angular distance (A) longer than the distance (B) by which the respective teeth (17,18) formed on the bottle (2) are separated angularly, thereby the abutment (14) of the trailing end (10) of the arched section (8) will engage the respective tooth (18) with a time lag.

3. A tamper-proof closure (1) according to Claim 2, characterized in that the abutment (14) located at the trailing end (10) is formed with a cutout (14a) defining a ramp (14b) for engagement with the upper edge (18a) of the respective tooth (18).
4. A tamper-proof closure (1) according to Claim 3, characterized in that it comprises a frangible auxiliary bridge portion (11a) extending between the abutment (13) located at the leading end (9) of the arched section (8) and the cap.
5. A tamper-proof closure (1) according to Claim 4, characterized in that it comprises a thin frangible jumper (19) extending endwise between the adjacent ends (9, 10) of the arched sections (8) and being dimensioned to be more easily ruptured than the bridge portion (11) located at leading end (9) of the arched section (8) and the auxiliary bridge portion (11a) in combination.

#### Patentansprüche

1. Eingriffsicherer Verschuß (1) für eine Flasche (2) und dergleichen mit einer Längsachse X-X, der eine Kappe (3), die auf die Flasche (2) auf- bzw. von ihr abgeschraubt werden kann, einen Dichtungsstreifen (6), der über Stegbereiche (11, 12) mit der Kappe (3) verbunden ist, sowie Vorsprünge (13, 14) umfaßt, die an dem Streifen (6) ausgebildet sind und mit entsprechenden Zähnen (17, 18), die an der Flasche (2) ausgebildet sind, in Eingriff kommen, wobei der Streifen (6) in wenigstens zwei bogenförmige Abschnitte (8) unterteilt ist, wobei jeder der bogenförmigen Abschnitte (8) ein vorderes Ende (9) und ein hinteres Ende (10) in der Abschraubrichtung (F) der Kappe (3) aufweist, die den Enden (10, 9) des benachbarten bogenförmigen Abschnitts (8) axial zugewandt sind, **dadurch gekennzeichnet**, daß zwei Stegbereiche (11, 12) und Vorsprünge (13, 14) für jeden bogenförmigen Abschnitt (8) vorhanden sind, die sich an dem vorderen Ende (9) und dem hinteren Ende (10) jedes bogenförmigen Abschnitts (8) befinden, wobei der Stegbereich (11), der sich am vorderen Ende (9) des bogenförmigen Abschnitts (8) befindet, einen schmalen Querschnitt aufweist, so daß er beim Eingriff des entsprechenden Vorsprungs (13) mit dem entsprechenden Zahn (17) gebrochen werden kann, und der Stegbereich (12), der sich am hinteren Ende (10) des bogenförmigen Abschnitts (8) befindet, einen Querschnitt aufweist, der so ausgewählt wird, daß er nicht gebrochen wird, sondern ein Gelenk (12a) um eine Achse r-r senkrecht zur Achse X-X bildet, um den bogenförmigen Abschnitt (8) nach dem Eingriff des entsprechenden Vorsprungs (14) mit dem entsprechenden Zahn (18) winklig zu verschieben.

2. Eingriffsicherer Verschuß (1) nach Anspruch 1, **dadurch gekennzeichnet**, daß die Vorsprünge (13, 14) jedes bogenförmigen Abschnitts (8) um einen Winkelabstand (A) voneinander entfernt sind, der größer ist als der Abstand (B), um den die entsprechenden Zähne (17, 18), die an der Flasche (2) ausgebildet sind, winklig voneinander entfernt sind, so daß der Vorsprung (14) des hinteren Endes (10) des bogenförmigen Abschnitts (8) mit einer Zeitverzögerung mit dem entsprechenden Zahn (18) in Eingriff kommt.
3. Eingriffsicherer Verschuß (1) nach Anspruch 2, **dadurch gekennzeichnet**, daß der Vorsprung (14), der sich am hinteren Ende (10) befindet, mit einem Ausschnitt (14a) versehen ist, der eine Abschrägung (14b) aufweist, die mit der Oberkante (18a) des entsprechenden Zahns (18) in Kontakt kommt.
4. Eingriffsicherer Verschuß (1) nach Anspruch 3, **dadurch gekennzeichnet**, daß er einen zerbrechbaren zusätzlichen Stegbereich (11a) umfaßt, der sich zwischen dem Vorsprung (13), der sich am vorderen Ende (9) des bogenförmigen Abschnitts (8) befindet, und der Kappe erstreckt.
5. Eingriffsicherer Verschuß (1) nach Anspruch 4, **dadurch gekennzeichnet**, daß er eine dünne, zerbrechbare Brücke (19) umfaßt, die sich axial zwischen den benachbarten Enden (9, 10) der bogenförmigen Abschnitte (8) erstreckt und so ausgelegt ist, daß sie leichter zerbricht als der am vorderen Ende (9) des bogenförmigen Abschnitts (8) befindliche Stegbereich (11) und der zusätzliche Stegbereich (11a) zusammen.

#### Revendications

1. Fermeture inviolable (1) pour une bouteille (2) et analogue ayant un axe longitudinal X-X, comportant une capsule (3) destinée à être vissée sur la bouteille (2) et dévissée de celle-ci, une bande (6) de scellage reliée à la capsule (3) au moyen de parties de pontets (11, 12), et des butées (13, 14) formées sur la bande (6) pour porter contre des dents respectives (17, 18) formées sur la bouteille (2), la bande (6) étant divisée en au moins deux sections en arc (8), chacune des sections en arc (8) ayant une extrémité avant (9) et une extrémité arrière (10) dans le sens (F) du dévissage de la capsule (3), faisant face aux extrémités (10, 9) de la section en arc adjacente (8), en bout, caractérisée en ce qu'il y a deux parties de pontets (11, 12) et butées (13, 14) pour chaque section en arc (8), situées, respectivement, à l'extrémité avant (9) et à l'extrémité arrière (10) de chaque section en arc (8), la partie de pontet (11) située à l'extrémité avant (9) de la section en arc (8) ayant une section transversale mince de façon à pouvoir être rompue lors d'un engagement

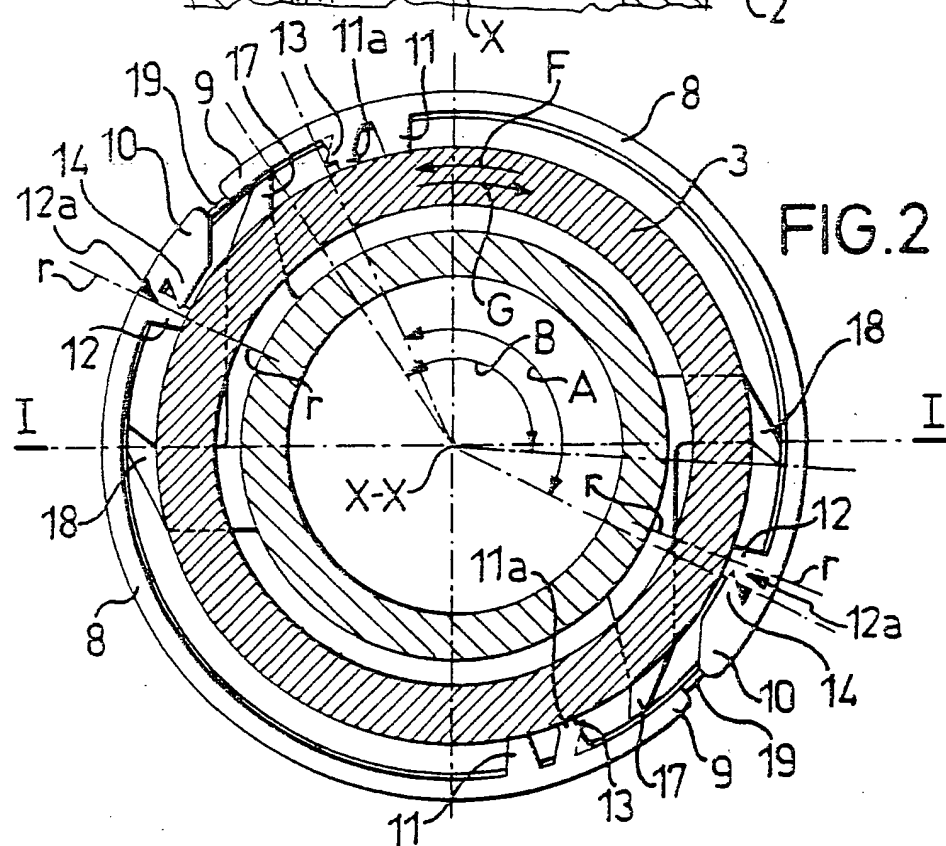
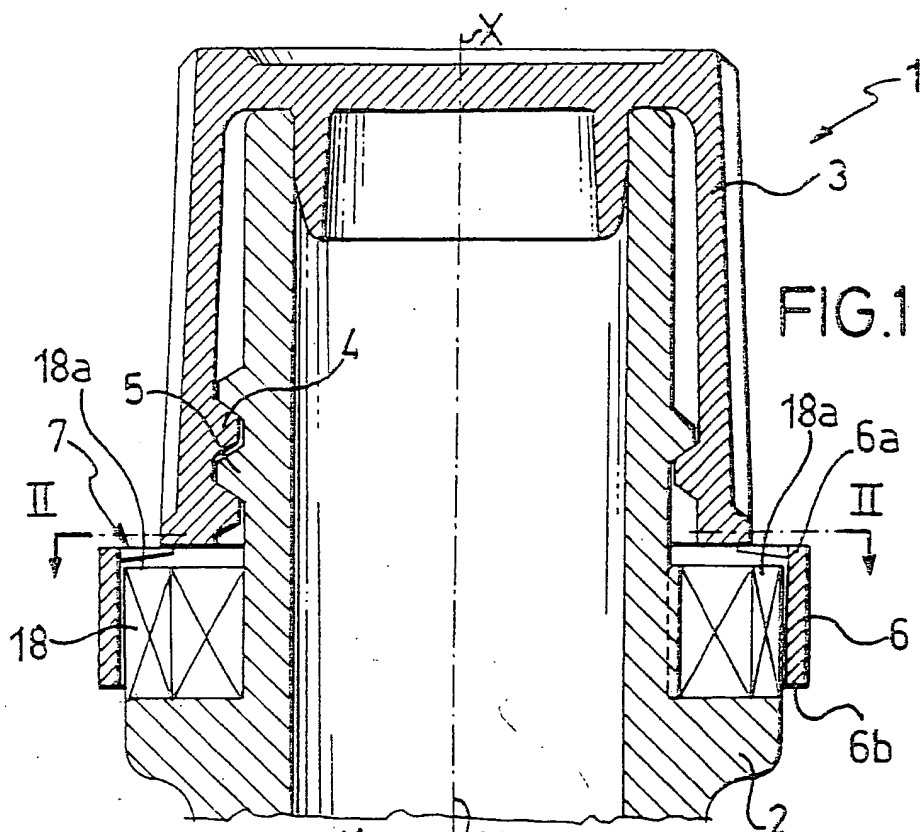
de la butée respective (13) avec la dent respective (17), et la partie de pontet (12) située à l'extrémité arrière (10) de la section en arc (8) ayant une section transversale choisie de façon à ne pas être rompue, mais à former une charnière (12a) autour d'un axe r-r perpendiculaire à l'axe X-X pour un déplacement angulaire de la section en arc (8), à la suite de l'engagement de la butée respective (14) avec la dent respective (18).

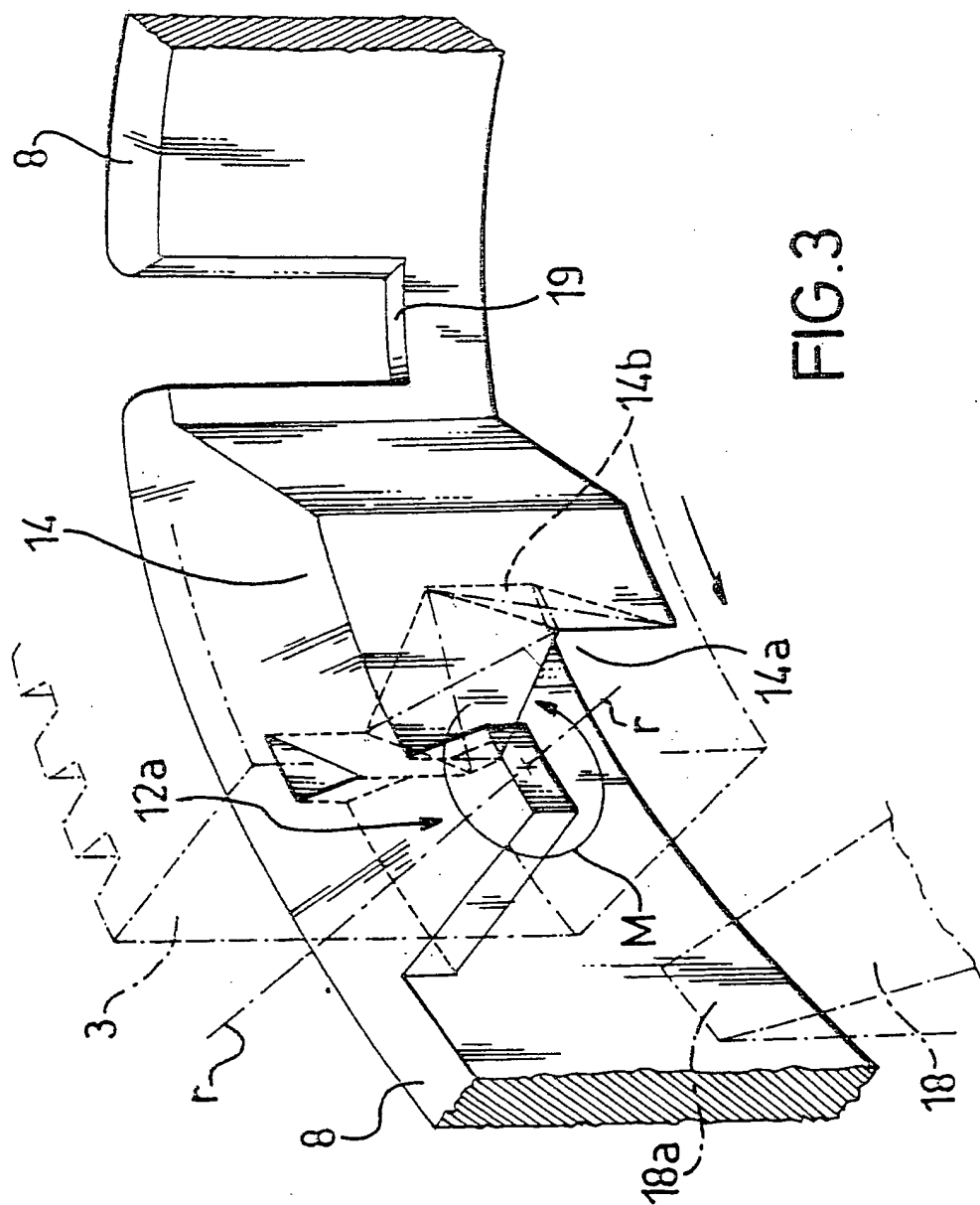
2. Fermeture inviolable (1) selon la revendication 1, caractérisée en ce que les butées (13, 14) de chaque section en arc (8) sont séparées par une distance angulaire (A) plus longue que la distance (B) séparant angulairement les dents respectives (17, 18) formées sur la bouteille (2), la butée (14) de l'extrémité arrière (10) de la section en arc (8) engageant ainsi la dent respective (18) avec un temps de retard.
3. Fermeture inviolable (1) selon la revendication 2, caractérisée en ce que la butée (14) située à l'extrémité arrière (10) est formée de façon à présenter une encoche (14a) définissant une rampe (14b) destinée à réaliser un engagement avec le bord supérieur (18a) de la dent respective (18).
4. Fermeture inviolable (1) selon la revendication 3, caractérisée en ce qu'elle comporte une partie de pontet auxiliaire (11a) pouvant être rompue, s'étendant entre la butée (13) située à l'extrémité avant (9) de la section en arc (8) et la capsule.
5. Fermeture inviolable (1) selon la revendication 4, caractérisée en ce qu'elle comporte une mince pièce de liaison (19) pouvant être rompue, s'étendant en bout entre les extrémités adjacentes (9, 10) des sections en arc (8) et dimensionnée pour être plus aisément rompue que la partie de pontet (11) située à une extrémité avant (9) de la section en arc (8) et que la partie de pontet auxiliaire (11a) en combinaison.

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